

LECTURE

INLAND WATERWAYS AND DOCKS, ROYAL ENGINEERS
IN WAR TIME, WITH SPECIAL REFERENCE TO THE
MYSTERY PORT OF RICHBOROUGH.

By Captain A. E. Battle, R.E., M.I.Mar.E.

In 1914 General French in one of his despatches called attention to the desirability of utilising the waterways of France and Belgium as means of military transport. The outcome of which was the formation of a branch of the Royal Engineers, namely, the Inland Water Transport, whose duties were to operate a barge system, in the seat of war, across the English Channel. This corps had a very small beginning, and at its inception consisted of one tug, two barges, and a small store at the headquarters, Dover. This small corps slowly expanded, and was subjected to such criticism as was then allowed, and no doubt would have been crushed by the hostile press and others had the censor not been in operation.

In 1916 the congestion of the ports and shipping of France and Britain, due to unsuitable transport facilities, occupied the serious attention of the authorities. This, coupled with the expansion of the Inland Water Transport, forced it to seek another home.

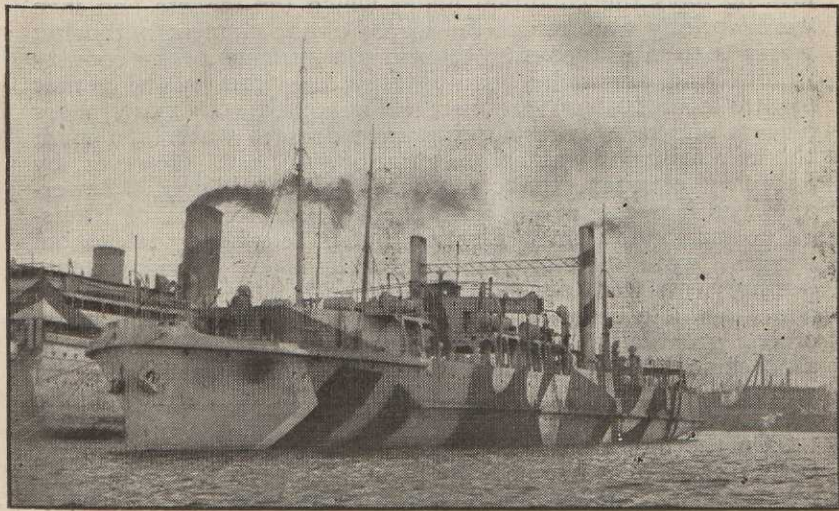
Having visited various sites, General Collard recommended the selection of Richborough, and Mr. Lloyd George, after inspecting the site, entrusted the work to General Collard.

Two schemes were proposed:—First, to deepen the existing channel of the Stour and extend the berthing accommodation at Sandwich; second, to establish an entirely new port at Richborough. The latter proposal was adopted.

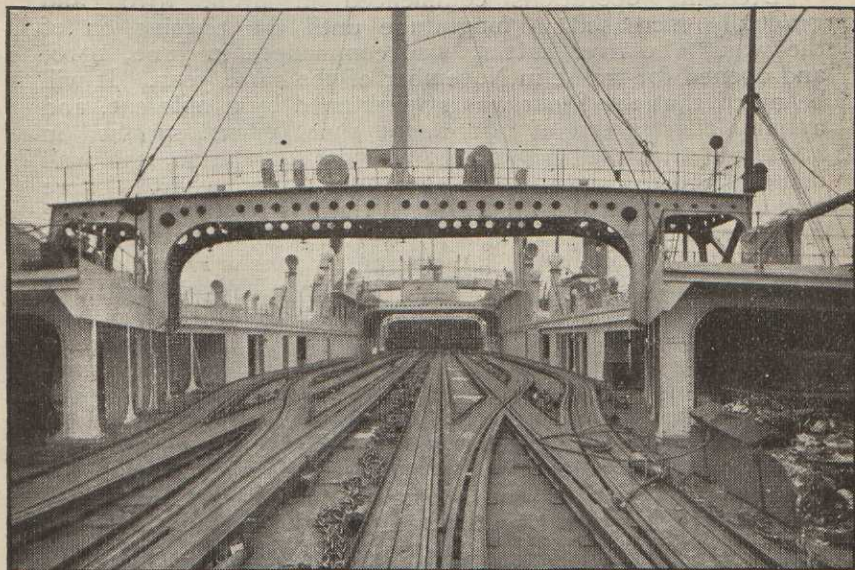
Messrs. Palmer and Trivott, Consulting Engineers, were associated with the scheme, but there is very little doubt that the inception and development are mainly due to General Collard and his staff officers and sappers.

The history of Richborough is an example of the growth and degeneration of a tract of land, its sudden transformation into a port of vital war importance, and an equally rapid decline into the condition of pre-war waste marshy land.

At first the R.E. established a camp under canvas, but this was quickly transformed into huts and eventually into a well-equipped and well-organised camp of concrete bar-



TRAIN FERRY.

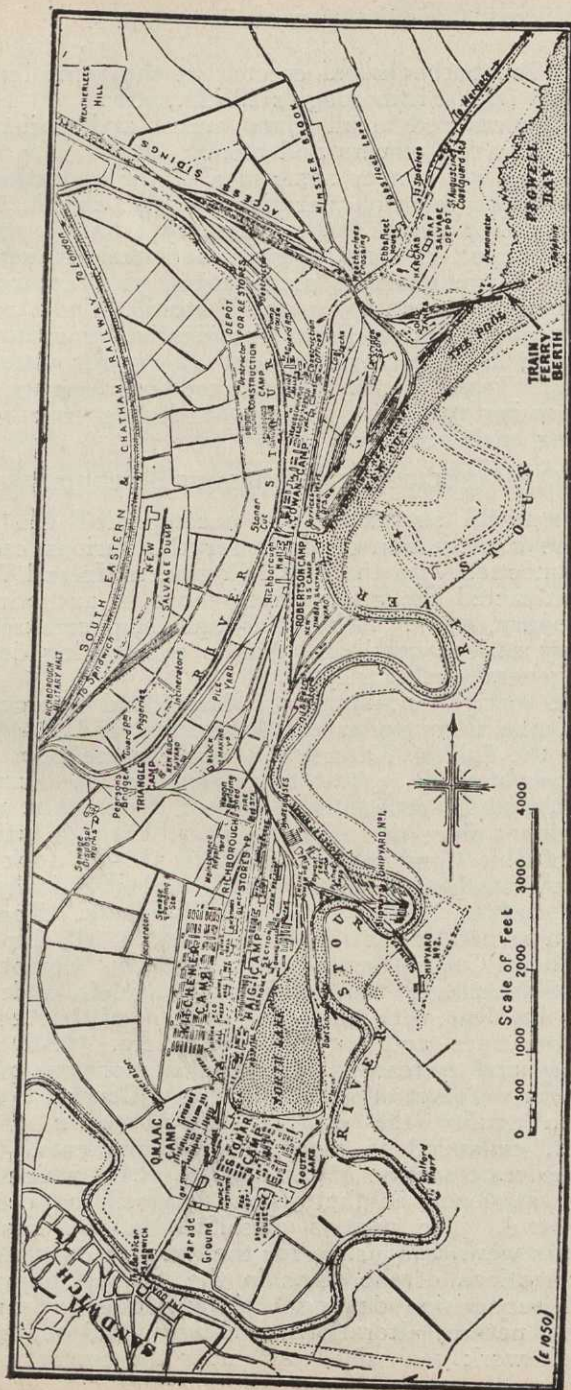


RAIL DECK—TRAIN FERRY.

racks and workshops of all descriptions. In the early pioneering days the condition under which the officers and men were working was, to use the words of one eminent authority, worse than in France even than in the trenches. The country is low-lying and more than marshy, and this in the winter months of 1916-1917 can best be imagined. In many cases officers and men were working knee deep in water and mud; the commissariat was at least not of the best. However, by February of 1917, the camp was well established. Sewerage was laid connecting with the adjoining towns of Ramsgate and Sandwich. Electric light, telephone, telegraph, wireless were installed and water laid on. Departments dealing with war transport and other matters were formed, and the whole camp operated, if anything, better than many of our great cities. Schools were formed for instructing in all technical branches, men were trained in all artisan work, and the whole place was a hive of determined patriotic industry.

On the first visit, which was in December, 1915, General Collard was accompanied by Lieut. Hudson, R.E., and another officer. Following this, the first detachment consisting of two officers and 50 men arrived at Richborough in February, 1916. The River Stour was surveyed by Captain Hudson in March, 1916. The bar was found to be practically dry at half tide. River barges drawing over 4 ft. grounded at half tide.

Dredging operations commenced in April, 1916, and gradually increased in magnitude until the termination of the war. The river cutting was commenced in June, 1916, and opened for traffic in November of the same year. It will be noted that the Stour was straightened by a mile cut, and a quay constructed of interlocked sheet piling, supplied in 40-ft. lengths, and driven into a sand foundation, the wall being protected with wood sheathing. The wharves were originally equipped with two-ton transporters, which were however, ultimately replaced with 10-ton travelling gantry cranes with a maximum capacity of 10 tons. Four lines of rails were laid behind the wharf, and in all eighty miles of siding were laid connecting up with the South-Eastern and Chatham Railway. Richborough was in fact a veritable kaleidoscope as regards the rapidity of changes. Locomotive repairing works were established, marine repairing works and slips laid down, all sections of engineering operations were in progress, and in the latter end of 1917 a ship erection yard was established where fabricated material for French canal barges and cross channel barges were re-erected. It is interesting to note that the first welded sea-going craft was completed in this yard. Small craft were built for the air force and other units of the army. The pill boxes, which played a prominent part in the war operations,



MAP OF RICHBOROUGH AND DISTRICT.

were built at Richborough and erected at the front by personnel supplied from Richborough's I.W.D., R.E.

Richborough covered in all 2,200 acres, and maintained a personnel of 20,000 officers and men.

The following will convey some idea of the operations at Richborough:—Two years of operations of I.W. and D., R.E., Richborough—9,654 barges loaded, 1,257,545 tons exported, 166,980 tons imported, 17,818 guns and limbers sent to France, 4,000 barge loads of ammunition, 784,741 tons of guns and ammunition, 70,877 tons of stores. On a record day 6,375 tons were sent to France besides handling imports, the latter being salvage from the seat of war amounting to 200,000 tons. Train ferries (year preceding Armistice).—370 trips carrying 900 tons per trip, including four 14 in. guns weighing each 302 tons.

DEPUTY COMPTROLLER OF AUXILIARY SHIPBUILDING.

The phenomenal success which accompanied the craft section in the construction of craft for the various centres of war in connection with the Royal Engineers' Inland Water Transports attracted the attention of those in authority on or about January, 1917. About this time ship construction was in a very serious condition, due to overlapping departments and general inefficiency.

Under the instigation, mainly of Mr. Lloyd George, Sir Eric Geddes, the Comptroller of Movements and Railways, under which the Inland Waters and Docks were operating, generally known as M.R. 3, was transferred to the Admiralty as first Lord, and he re-instituted an old department which had been dormant since the time of Queen Elizabeth, namely, the Control of Ship Construction. Sir Eric Geddes took with him to the Admiralty General Collard, and practically the whole of the craft section of the Royal Engineers. The new Department assumed control in April, 1917, of all ship construction, General Collard being appointed Deputy Comptroller of Auxiliary Shipbuilding, the Admiralty being left, under the Comptroller, to deal with the construction of battleships, cruisers, submarines and torpedo destroyers. All other naval, military and mercantile ship construction was placed under the Deputy Comptroller's Department, General Collard. This was in reality the original craft section of the I.W.D., R.E., expanded to meet new requirements. The officers of the craft section of the I.W.D., R.E., which were at that time stationed at the various shipbuilding centres, assumed control. The various classification societies and their surveyors were responsible for the detailed carrying out of the specifications of the ships in the various shipyards. The general supervision dealing with any question arising of a technical nature, alterations, additions, and the supervision of their work generally, was under the control of the

officers of the Deputy Comptroller's Department. By this means the serious shortage and the critical position which had arisen during 1917 and 1918 were surmounted, and the credit was mainly due to the organising efforts of General Collard.

During that period engineering works which were entirely foreign to the marine side were requisitioned for the construction of parts of engines, engines complete, auxiliaries or boilers. For instance, Messrs. Fullerton, Huggart and Barkly, the well-known sugar refiners of Paisley, were employed in the manufacture of standard engines. This was universal. The craft section of the Royal Engineers was then re-organised, but was not of the same magnitude as it was at its original inception. Any vessel for the Royal Engineers, for the Air Force, for the Mercantile Marine, or for the Admiralty, were as far as construction was concerned, under the control of the various sections of the Deputy Comptroller's Department, and it is commendable to say that the Department in its first year more than justified its existence, and the British Empire has at least a debt of gratitude to the organising officers of the same. Very many ventures were undertaken. The Royal Engineers, under the Deputy Comptroller's Department, were responsible for many daring technical experiments.

The fabrication of ships for the Royal Engineers, and for the Royal Engineers I.W.D., was largely extended. Tenders were sent out from Richborough for the various parts to the shipbuilding centres. The parts were fabricated, passed by the Deputy Comptroller's surveyors, and forwarded to Richborough and other war centres such as Salonica, France, Egypt, East Africa, etc., for re-erection.

The experiment of concrete shipbuilding was also introduced, but unfortunately did not prove what would be considered a great success. Concrete barges carrying 500 tons dead weight capacity were constructed, and ten concrete tugs. This was the latter end of the war, and the experience in construction of the few vessels were not available for future trials.

The standardising of ships which had been started by the Minister of Shipping, was also extended. Unfortunately certain of the standardising efforts were open to criticism, and it is questionable whether it would not have been better to have allowed certain of the firms which were actually making the standard design to have continued in this work without interference.

However, in spite of certain mistakes which in such an undertaking as this are unavoidable, the ship construction in the British Isles was really greatly accelerated.

A unique standard design of a standard ship was under consideration, and tank experiments were conducted at the

experimental tank of Denny and Co., and the whole of the designs for a type of fabricated standard ship were under consideration. The scheme consisted of a design of a vessel with a rectangular midship section, square chines, and the keel line following the stream line of the ship, the shear of the vessel to follow the keel, and all parts were to be of a standard section. The floors were constructed on the lattice girder system, the idea being that any one part of the vessel such as side plating or bottom plating or bulkhead were interchangeable.

From information, which I had personally gained, an experiment conducted with the models of Messrs. Denny and Co. proved that the efficiency of such a craft was certainly not up to the standard of a first-class liner, but was equal to the ordinary standard tramp, and so the opportunity of testing the attractive proposition of fabricated standard ship construction was lost for years to come.

TRAIN FERRIES.

In the early part of 1917 the attention of General Collard was directed to the proposition of train ferries for transport purposes across the English Channel. As a matter of fact, this was brought to the notice of General Collard by Major Young, an officer of one of the Scotch regiments, who had been wounded at the front and seconded to the Royal Engineers I.W. and D. When Major Young first mooted the proposal to General Collard, it was for the time being rejected. Some weeks after this, however, Major Young was given open instructions to go around the shipbuilding centres and gather as much information as he could regarding the construction of Train Ferries. It was mainly owing to the valuable data which Major Young was then able to collect that enabled the train ferries to be, at the first experiment, so efficient a masterpiece of naval architecture and marine engineering. Train ferries are not new, but the fact remains that the collecting of the data at such abnormal times as the British Empire was experiencing in the early days of 1917 was no small task. Train ferries were running in Denmark, Sweden and Germany, and in United States, and particularly on Lake Michigan, where trains were carried by ferries a distance of some 240 miles. It is satisfactory and gratifying to note that the idea of train ferries originated with a British engineer and naval architect. The first train ferry to be constructed, I believe, was on the River Nile in the early 50's, and also on the Firth of Forth, between Granton and Brunson, and across the River Tee in 1860.

In 1917, the train ferries, as applied to war transport, crystallised under the inception of General Collard. The train ferries operated from Richborough to Calais and Dunkirk, which ports served the northern war zone; and from

Southampton, serving the southern war zone by means of Dieppe and Cherbourg. The type of vessel which was decided upon, and which was constructed, had a fixed train deck. Variations of the tide were provided for by means of suitable landing apparatus at the ports above mentioned. The train ferry pier was constructed of wood. In design it consisted of a long jetty to which the vessel could be moored, and a short spur jetty to guide and hold the vessel in position at the berth. These jetties were provided with the usual bollards for mooring the vessel. An adjustable bridge provided the means of connecting the ship and the shore. This bridge was hinged at the shore end, and the other end rested upon the stern of the ship, the vessel being thus able to rise and fall with the tide, and yet be available for loading purposes.

The variation of tide allowance and the length of the bridge at the various ports were as follows:—

Richborough and Calais.—Length of bridge, 100 feet, giving total range of 10 feet.

Southampton and Dieppe.—Length of bridge, 120 feet, giving total range of 12 feet.

Dunkirk.—Length of bridge, 80 feet, giving total range of 8 feet.

Upon this bridge was constructed two rail tracks 4 feet 8½ inches gauge, the rails being placed centre to centre 11 feet 6 ins.

Loading conditions allowed for were: two trucks, or shunting engine and one truck only, a locomotive and tender 172 tons, or one truck only with 14-inch gun and railway mountings complete. These conditions were ultimately greatly exceeded.

The bridge was constructed of two main girders which were hinged on the shore and suspended 20 feet from the outer end by wire ropes from two steel towers which formed the portal. The bollard sheaves and winding drums and counter weights provided the means for raising and lowering the bridge. The counter weights were somewhat less in weight than the bridge itself, leaving an unbalanced weight of about 10 tons to be carried by the operating gear. When the vessel was moored the load was taken by the stern of the ship. An electrical winding engine was installed on top of the cross girder of the portal. The winding engine and gear was so constructed that directly the weight of the bridge was taken by the ship the whole of the weight was automatically run free.

To bring the rails of the vessel into line with the shore rails the stern of the vessel was fitted with a forged steel pin 7 in. in diameter, which loosely fitted into a slot of a cast steel guide bracket on the bridge. This gear was

capable of withstanding a pull of 25 tons in any direction. The rails were so constructed that they formed a telescopic junction, and an allowance was made of five degrees list port or starboard. The bridge was operated by an electrical motor situated in a cabin on top of the portal. The dimensions of the train ferries are as follows:—Length, 363 feet 6 inches; breadth, 61 feet 6 inches; moulded depth, 17 feet; draft, 9 feet 6 inches; speed 12 to 16 knots per hour.

They were of twin screw construction, and arranged with four shell boilers in pairs along the side of the ship. These boilers worked at 180 lbs. pressure and had 3,820 sq. ft. of heating surface. There were two sets of White oil-fuel burning apparatus, and all the latest marine equipment and machinery. Accommodation for officers and men was below deck.

The ship was armed with quick-firing guns, and equipped with searchlights, wireless and other means of protection and defence. There were three of these vessels built, one at Fairfield works, Glasgow, and the other two at Armstrong Whitworth's. They were alike in every detail.

It is an interesting fact that during eight months the train ferries carried 47,686 ten-ton trucks of munitions of war, and 22,733 tons gross weight. They carried air craft for war purposes, 685 tanks, 150 locomotives, besides big guns, munitions of war, and all types of returned derelicts—air craft, motor vehicles, locomotives and the like. The above only refer to the T.F. 1 and 2 operating from Richborough, to which must be added the trips of T.F. 3 operating from Southampton.

A series of slides were shown illustrating the erection of the train ferry piers, oil tanks and vessels.

MESOPOTAMIA.

Inland Water Transport.

At the outbreak of the war, 1914, the river transport service of Mesopotamia was under the control of the Royal Indian Marine, Indian Office, and at that time the fleet consisted of three steamers and four lighters. These were increased in number by craft from India, but even in 1916, just before the fall of Kutt, the fleet was absolutely inadequate for the work which it had to do. The tragedy of the fall of Kutt is said to be due to the inefficiency or want of river transport, which, as a matter of fact, was the only means of transport in Mesopotamia. The Royal Commission dealing with the subject stated that the transport was lacking in December, 1914, became worse in 1915, and, notwithstanding the attempts to cope with it, the congestion became so great that in 1916 transport became impossible.

This restricted operations and inflicted hardships upon the troops, and particularly upon the wounded. In fact, it took nearly two months to convey 12,000 men and 26 guns a distance of a few hundred miles, and to this can be attributed the fall of Kutt. The Royal Indian Marine and the army generally had failed to cope with the conditions. In April of 1916 the Royal Engineers I.W.T. took supreme command of all inland water transport of Mesopotamia.

Before this period the condition leading up to this action was the utter failure of the Indian Office in connection with transport and the construction of vessels and like matters. A number of boats were ordered from England through the Indian Office. These were sent out in sections unnumbered. There were no re-erection plates, and the parts for the various ships were landed at different places along the beach; consequently to complete one craft it was necessary to scour the beach for miles in search of the missing part. This was the condition of affairs which existed when Colonel Gray, Major Hughes and Captain Ratsey assumed control of the transport in Mesopotamia and organised the Inland Water Transport, R.E., of Mesopotamia. This corps worked independently, but subject to the control of Inland Waters and Docks, England, who organised the drafts of officers and men, sent out material, and arranged all technical matters in connection with the service. The Inland Water Transport Mesopotamia had their branch training headquarters in Glasgow, numbering 200 officers and 1,000 men. They also established depots along the line of route from India to England, starting at Glasgow, Gibraltar, Malta, Suez, Aden, and running to Mesopotamia. The vessels in some cases were completely constructed in England, and sailed out under their power under convoy. In other cases re-erection craft were built, all parts were numbered, and dismantled and shipped in sections to be re-erected. The transporting under their own steam of such craft as hospital ships, light draft tugs, etc., is really a record in shipping history. The vessels were first strengthened by fore and afters and suitably boarded in, and sailed under their own steam through the war zone via the Mediterranean to their ports in Basra. The following gives some idea of the difficulties which they had to encounter. First, the very light construction of the vessels would not permit them to be hove to in bad weather in the usual way, and, contrary to all existing practice, the vessels were hove sideways on. By this means they rode upon the waves and escaped any strain due to bad weather conditions.

List of Casualties.

P.S. 57—Stranded in Red Sea.

P.T. 1—Foundered off the Isle of Wight.

P.T. 62—Sunk by submarine.

S.P. 17—Foundered in the Mediterranean.

S.P. 21—Foundered at sea.

H.S. 3 and 4—Sunk by the enemy.

P. 6—In action with the enemy, and fought with one 4-pound gun, and ultimately sunk the enemy in the Mediterranean.

The strength of the main fleet in 1915 consisted of 446 self-propelled vessels, 774 barges, 414 motor barges, besides other small craft.

I.W.T. IN OTHER WAR CENTRES.

The operations of the Inland Water Transport under the direction of the I.W.D. in other theatres of the war were almost as gigantic as that of Mesopotamia and France. The whole of the canals in the war area of Belgium were under the control of the Inland Water Transport Branch. Tugs operating from R.E. ports of Richborough, Dover, Southampton, Fowey, Poole, London and Hull towed from two to five barges varying from 50 to 1,000 tons each across the Channel to the various war ports. From there the Inland Water Transport tugs of France took charge of the special barges built for canal work which had been brought across the Channel fully loaded were conveyed through the canals, in the war zones, to their destination in the firing line. The Inland Water Transport of France was upon the same magnitude as that of Mesopotamia, and the general in command, I.W.T., France, held a seat upon the War Council in G.H.Q., France. By this means the congestion of the ports was removed, and the mercantile shipping which had been used for transport from England to France was released for more useful work. The operations in Salonica and in Italy mainly consisted of the control of docks and the transport of the inland waterways. In Egypt the whole of the Nile flotilla was commandeered together with the various shipyards, and a large number of light craft vessels were re-erected under the construction section of the I.W.T., Egypt, and operated upon the Nile and similar waterways. In British East Africa the Inland Water Transport took charge of the overseas transports immediately upon the vessel arriving in port, and were responsible for the loading and unloading, and for the distribution of the cargoes and the transport of the cargoes in local waters.

So efficient was the organisation that under the Inland Water Transport, the pilferage was reduced to .2 per cent. and delays and losses practically eliminated. Colonel Hudson was personally thanked by letter by the authorities in Africa for his services in this connection.

During the retreat of the Allied Forces in the early months of 1918 train ferries and the barge system of the Inland Water Transports were mainly employed in bringing material back from the Channel ports to France, and it was generally considered probable that those ports would be lost to the enemy, in which case London, the East Coast, and particularly Richborough would have been inoperative. In March, 1918, orders were received by the Inland Water Transport of Richborough for a detachment of 2,000 sappers and officers to proceed to Poole, with a view of constructing another mystery port. The work was well in operation when, as history records, the tables were turned, the Germans were in full retreat, and, synchronising with this retreat, the activities of Poole ceased.

It has been the author's endeavour to convey in a general manner the magnitude of the operations undertaken by the Inland Water and Docks and Inland Water Transport, R.E. The ramifications of this corps were widespread, not only operating in England and France, but in other theatres of war. At Richborough alone 20,000 sappers were employed, in Mesopotamia the strength amounted to some 50,000. The operations in France were practically on the same magnitude of those of Mesopotamia, and to these must be added Egypt, Salonica, East Africa and Italy. It is interesting to note that the Inland Water and Docks operated in Northern Russia during the latter end of the war, and some 25 A.C. barges were specially fitted up by the craft section of the I.W.D. for that service. In the ranks of the Inland Water Transport and Inland Water and Docks, R.E., were to be found men of all commercial trainings connected with transport work, all types and classes of engineers, artisans of all grades and callings, and on the whole it can be said that the organisation was successful in fitting round pegs into round holes, and even if a square peg inadvertently did happen to be allotted to a round hole, the organisation was such that the square peg very quickly took its bearing, and was firm and solid. The corps is a lasting monument of technical achievement due to team action inspired by true patriotism.

DISCUSSION.

The PRESIDENT said they were indebted to Captain Battle for his kindness in delivering his lecture. As had been seen from the photographs submitted, the site of the mystery port of Richborough when the Royal Engineers undertook the work was most unpromising. In early Saxon times there was a navigable channel from the Straits of Dover to the

mouth of the Thames, which caused Thanet to be an island. It was here that the Romans landed, and until a few years ago could be seen on the walls of some of the cottages close to the channel the rings to which the Romans moored their vessels. Captain Battle had shown the great work the Royal Engineers did for our country and the tremendous labour involved in converting the channel of the River Stour into a harbour. He had much pleasure in moving a hearty vote of thanks to Captain Battle.

The vote was carried by acclamation.

MR. A. MCCOWAN said they were deeply indebted to Captain Battle for his lecture. He had shown the wonderful service the Royal Engineers had performed in the war, and had demonstrated the fact that our race is by no means a back number.

MR. W. REID BELL said the Forth ferry and the Tay ferry had carried the whole traffic of eastern Scotland for 40 years until the Forth bridge was completed. They were exactly on the lines of the ferries used at Richborough. The landing stages were movable, and the slips upon which they moved ran right under water; the landing stages were run up and down according to the state of the tide. They were very successfully worked, and the application of that idea to the transport at Richborough was excellent.

MR. R. J. BEVIL-SHARPE said he had listened to the paper with great interest. When he went to school in Germany he had travelled in a train on a ferry over the Rhine. There was also a train ferry at Grantham, which was used for goods service only.

MR. A. E. HUGHES wished to add his meed of appreciation of the most interesting lecture. It was especially gratifying to know that when the necessity arose the British nation brought forth the men with the skill and science and industry to carry out work of the description they had seen. It showed that the race was not decadent. He was specially impressed with Captain Battle's description of the conditions under which the work was carried out at Richborough. The men commenced by living in tents; very soon they had erected huts, and these were almost immediately followed by concrete houses. The train ferry, although in itself not new, was for the purpose for which it was utilised one of the highest achievements of the war. It showed what an immense amount of ingenuity and application was employed by our country to bring the matter to a successful issue.

Captain Battle returned thanks for the remarks of appreciation; and at 10 p.m. the meeting closed.



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